

**THAT WHICH IS CLAIMED IS:**

1. A method for the targeted insertion of a nucleotide of interest into a specific chromosomal site within a plant cell, said method comprising the steps of:

5 (a) providing a plant cell having a heterologous target site on a chromosome thereof, wherein said target site is flanked by at least one recombination site; and then

(b) transforming said plant cell with an *Agrobacterium* transformation vector carrying a nucleotide sequence of interest, wherein said nucleotide sequence of interest is flanked by at least one recombination site that correspond to the  
10 recombination sites of said target site, so that said nucleotide of interest is inserted into said chromosome at said target site.

2. A method according to claim 1, wherein said transforming step is carried out in the presence of a site-specific recombinase effective to carry out recombination  
15 at said recombination site and insert said nucleotide of interest into said chromosome at said target site.

3. A method according to claim 1, wherein said target site is flanked by a single recombination site positioned 5' thereto.

20 4. A method according to claim 1, wherein said target site is flanked by a pair of recombination sites positioned 5' and 3' thereto.

5. A method according to claim 1, wherein said nucleotide sequence of  
25 interest is flanked by a single recombination site positioned 5' thereto.

6. A method according to claim 1, wherein said nucleotide sequence of interest is flanked by a pair of recombination sites positioned 5' and 3' thereto.

30 7. A method according to claim 1, wherein said heterologous target site is inserted into said chromosome by *Agrobacterium*-mediated transformation.

8. A method according to claim 1, wherein said recombinase is an integrase.

9. A method according to claim 1, wherein said recombinase is selected from the group consisting of FLP recombinase, Cre recombinase, and recombinase R.

10. A method according to claim 1, wherein said recombinase is FLP  
5 recombinase, and said recombination sites are FLP recombination target (FRT) sites.

11. A method according to claim 1, wherein said plant cell is a dicot plant cell.

10 12. A method according to claim 1, wherein said plant cell has a genome size greater than 500 megabases.

13. A method according to claim 1, wherein said transforming step is carried out *in vitro* on a population of cells, some of which are transformed and some of  
15 which are not transformed, and said transforming step is followed by the steps of:  
selecting at least one transformed cell from said population of cells; and then  
regenerating a plant from said at least one transformed cell.

14. A method according to claim 13,  
20 wherein said selecting step is carried out by contacting said population of plant cells to an antibiotic;  
and wherein said transforming step is carried out with a vector that carries a selectable marker, which selectable marker imparts resistance to said antibiotic to said transformed cells.

25

15. A plant cell produced by the method of claim 1.

16. A plant produced by a method according to claim 1.

30 17. Seed produced from a plant according to claim 16.

18. Pollen produced from a plant according to claim 16.

000021" 68855260